DISPLAY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is based upon and claims the benefit of priority from prior Japanese Patent Application No. 2005-098657, filed Mar. 30, 2005, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a display, and in particular, to an active matrix display in which pixels are supplied with current signals as video signals.

[0004] 2. Description of the Related Art

[0005] U.S. Pat. No. 6,373,454 describes an active matrix organic electroluminescent (EL) display in which each pixel circuit includes a current mirror circuit. In this display, a current signal is supplied to each pixel as a video signal to allow an organic EL element to emit light at a luminance corresponding to the magnitude of the video signal.

[0006] To drive the display, an active scanning period and a blanking period (vertical blanking period) are normally alternated. During the active scanning period, for example, pixels are sequentially selected for each row, and a video signal is written to the selected pixels. The organic EL element in each pixel should emit light at the luminance corresponding to the magnitude of the video signal, during a non-selection period of the active scanning period and during the blanking period.

[0007] However, the present inventor has found the following fact in making the present invention. In a display in which a current signal is written to each pixel as a video signal, pixels in several rows first selected during an active scanning period may not display gray levels in a low gray level range with a high reproducibility. This is particularly marked if video signal lines connect to a protection circuit that prevents electrostatic damage to a circuit in a video signal line driver or in each pixel.

BRIEF SUMMARY OF THE INVENTION

[0008] An object of the present invention is to make it possible that a display in which a current signal is written to each pixel as a video signal achieves an excellent image quality on pixels in rows first selected during an active scanning period.

[0009] According to an aspect of the present invention, there is provided a display comprising a video signal line, a current source which outputs a video signal, a voltage source which outputs a reset signal, and pixels which are arranged along the video signal line, each of the pixels including a drive circuit which outputs a drive current at a magnitude corresponding to a magnitude of a video signal, and a display element which changes its optical characteristics in accordance with a magnitude of a current flow through the display element, wherein the display is configured to alternately repeat an active scanning period and a blanking period, sequentially select the pixels during the active scanning period, execute a write operation on the selected pixel, execute a display operation on each of the non-selected pixels, and execute a reset operation during the blanking period, wherein the write operation includes connecting the drive circuit to the current source via the video signal line to write the video signal on the drive circuit while disconnecting the display element from the drive circuit, wherein the display operation includes connecting the drive circuit to the display element to make the drive current flow through the display element while disconnecting the drive circuit from the video signal line, and wherein the reset operation includes connecting the voltage source to the video signal line to write the reset signal on the video signal line while disconnecting the current source from the video signal line.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0010] **FIG. 1** is a plan view schematically showing a display according to a first embodiment of the present invention;

[0011] **FIG. 2** is a partial sectional view schematically showing an example of a structure that can be adopted for the display shown in **FIG. 1**;

[0012] **FIG. 3** is an equivalent circuit diagram showing a part of the display shown in **FIG. 1**;

[0013] **FIG. 4** is a timing chart schematically showing an example of a method of driving the display shown in FIGS. **1** to **3**; and

[0014] **FIG. 5** is an equivalent circuit diagram showing a part of a display according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Embodiments of the present invention will be described below in detail with reference to the drawings. In the drawings, components achieving the same or similar functions are denoted by the same reference numerals and duplicate descriptions will be omitted.

[0016] **FIG. 1** is a plan view schematically showing a display according to a first embodiment of the present invention. **FIG. 2** is a partial sectional view schematically showing an example of a structure that can be adopted for the display shown in **FIG. 1**. **FIG. 3** is an equivalent circuit diagram showing a part of the display shown in **FIG. 1**. In **FIG. 2**, the display is drawn so that its display surface, that is, its front surface or light emitting surface faces the bottom of the drawing, while its rear surface faces the top of the drawing.

[0017] The display is a bottom emission organic EL display employing an active matrix driving method. The organic EL display includes a display panel DP, a video signal line driver XDR, and a scan signal line driver YDR.

[0018] The display panel DP includes an insulating substrate SUB such as a glass substrate. For example, an SiN_x layer and an SiO_x layer are sequentially stacked on the substrate SUB as an undercoat layer UC shown in **FIG. 2**.

[0019] Semiconductor layers SC such as polysilicon layers in each of which source and drain are formed, a gate insulator GI which may be formed by using tetraethyl orthosilicate (TEOS), and gates G which are made of, for